USER AND MAINTENANCE MANUAL

DIESEL CABINET NET CLEANER

D-Drive K-136-300-SD, D-Drive K-188-300-SD-JD and D-Drive K-240-280-SD-JS

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For a thorough introduction of Your AKVA product, we ask that all users read this entire manual. If questions occur, contact us!

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1 Safety

Safety for the users of our equipment is top focus when AKVA group ASA develop new products and product manuals.

We therefore strongly recommend that everyone that use the equipment, all that perform any type of repairs, service or other maintenance to the product, and all that work in areas where the product is installed read this entire manual and at least this safety chapter.

This recommendation is based on both personnel safety as well as a desire to keep the products in order and avoid damages risked if the safety instructions are not followed.

1.1 Safety symbols

The following safety symbols are used in this manual:

Information

Show caution, danger of damaging equipment and mild injuries to personnel

Use ear protection

Warning, may cause injures to personnel

Dangerous situations may occur, danger of escaping

1.1.1 Other symbols used in this manual

Go to or see page or chapter for further instructions or more information

The net cleaning system must not be operated, and no work may be performed on the system before the entire manual and especially the safety precautions described in this chapter have been read and understood

1.2 General safety

Show general caution when using high pressure equipment. The equipment generates strong forces and may cause severe damage to both personnel and equipment if used incorrectly. When using high pressure net cleaners, the "Regulations about high pressure cleaning and more" (FOR 1992-02-13 nr 1263: Forskrift om høytrykksspyling m.m.), has to be complied. According to § 4 in these regulations, overstepping them is a legal offence.

1.3 Personnel safety

All personnel must be trained in how to operate the equipment, and also be instructed in all dangers that may occur by improper use. (ref. § 6)

Employer is responsible for informing all personnel about all safety precautions as well as explaining which of the operations may cause personnel injuries. All personnel must be instructed in all of the safety instructions, and it is employers responsibility every employee understands these instructions. (ref. § 7)

Employer must instruct all personnel to use appropriate safety equipment and garments when working with high pressure systems. Always use antiskid footwear when walking around the cage edge. (ref. § 9)

If the net cleaner operator can not see the pumping aggregate directly, an assisting operator is required. The net cleaner operator must be able to communicate with the assisting operator, preferably visually. (ref. § 22)

Sealing leaks within piping- or hose fittings, must only be performed on depressurized equipment. (ref. § 13)

Employer is responsible of marking all areas where high pressure equipment is being used, as well as securing the danger area properly. (ref. § 23)

When cleaning with manually operated high pressure equipment, only devices with balanced reaction force must be used. Only one diver may stay in the water where the high pressure washer is being used. A diving assistant must control the pumping aggregate, so that the process can be shut down immediately in case of an emergency. (ref. § 26)

Under aged personnel (under 18 years of age) must not operate the washer alone. (ref. Regulations about work performed by children and youth, § 9)

1.4 Equipment safety

1.4.1 Storage

Do not store the equipment at too high temperatures because of the risk of contagious Legionella bacterial growth within the system. It is advised that the equipment is rinsed off with a narrow beam of fresh water directed away from people after storage.

Salt water drying inside the high pressure pump and components surrounding the pump (suction pump, filters, bypass valve, hoses or other salt water leading components) must be avoided. When this happens, salt crystals are left inside as the water vaporises, and they may cause damage to gaskets and sealings, high abrasion and reduces the equipment's functions. Therefore, if the equipment is going to be stored for more than one week, it is recommended that the entire system is flushed through with fresh water before placing in storage.

For over winter storage, avoid temperatures below the freezing point (100^0C and 32^0F). It is also recommended to flush the system with a water containing anti-freeze fluid, to prevent the inside water to freeze and possibly destroy the equipment if exposed to freezing-temperatures. The antifreeze solution will also function as lubricant for the system and its internal components.

1.4.2 General treatment of the equipment

All mechanical and electronic equipment used in the aquaculture industry must be maintained properly in order to function over time and according to expectations, especially in periods when they are being used the most. High pressure washers work in demanding environments with high pressures, large amounts of water and an aggressive corrosive salt water environment. Because of this, following the maintenance instructions are highly required.

Materials that do not require much maintenance are chosen for most of the critical components. Most of the exterior components, however, would be too expensive to produce of corrosion resistant materials. Therefore, rinsing the equipment with fresh water after every use is highly recommended to avoid surface corrosion.

All the movable parts, such as hinges, locks, gas regulators, wheels and such, must be lubricated after rinsing. If scratches or other damages appear in any enameled surfaces, these must be sealed with wax or lubricant immediately in order to prevent further corrosion.

Before using the equipment, always make sure it stands steadily, and if necessary, is securely attached to the foundation to prevent it from slipping and damaging its surrounding equipment or personnel.

If the equipment is going to be moved from one site to another, it is required by law to disinfect the equipment to avoid spread of contagious diseases. Some disinfectants may be aggressive to some metals, o-rings, sealings and other internal components. Therefore, rinse the equipment after use of disinfectants, both inside and outside, with fresh water.

1.4.3 Inspection before use

High pressure water represents massive forces, and therefore it is important that critical components are inspected and tested frequently.

Bypass/safety valves are installed at all high pressure equipment to ensure that no higher pressure than the maximal pressure endured by the various components occurs. The safety valve is set to open up for water flow in case the water pressure inside the system exceeds the predetermined level. If any of these valves are out of order when the system runs, this can cause severe damages to the equipment and injure personnel. (ref. § 30)

The safety valve is set to a pressure value the equipment endures while in use. Never change this value to a higher pressure. (ref. § 14)

All hoses used in the construction, must be able to endure the working pressure of the equipment. Read the mark on all hoses to make sure they can bear the pressure before using them. All hoses must be inspected for external damages. If the hose is damaged, it must be replaced or repaired before use.

The information regarding safety in this manual must not be construed as a warranty by AKVA group ASA that the high pressure washer will not cause injury or damage even if all safety instructions have been complied with

1.5 Receiving new equipment and warranty

Make sure that all parts are delivered according to the service note.

If the order should not be complete, or any defects are discovered, contact AKVA immediately, contact information is found in chapter 2.1.

AKVA group ASA offers a 1 year warranty, covering production defects. This warranty is efficient after date of shipment to original customer.

2 Introduction

This user manual is part of the equipment delivered with Akvasmart Idema Net Cleaner. Keep all belonging manuals as long as the net washer is in use, and make sure that all changes to any of the equipment are being noted in the manual.

Thank you for choosing AKVA group ASA as supplier for your high pressure net cleaning system. Do not hesitate contacting us if you need more information regarding use or maintenance for your product.

With four house brands, AKVA group ASA is a world leading supplier of technical aquaculture equipment. Since 1980 we have developed and produced fish farming equipment, both for cages at sea and for land based hatcheries. AKVA represents an industrial standard, which is presumed to be the turn key to the future. Research, project management, fast deliveries and customer follow-up have been in focus to ensure that we deliver the best possible and most cost efficient equipment, and thus contributing to preserve a sustainable aquaculture and a positive development within the aquaculture industry.

We have a wide variety of products, for example: plastic and steel cages, high pressure washers, net washers, boats, feed barges, feeding systems, cameras, sensor systems, under water lighting, software for fish farming and recycling systems.

We practice continuous product development to improve the equipment's safety, functions, manner of operation and working reliability. All our net cleaning products are developed and produced according to the following standards and procedures:

- ISO-EN 12100 Part 1&2: Safety of machinery
- EC-Directive 98/37/EC: Machinery Directive
- EC-Directive 97/23/EC: Pressure Equipment

All of our equipment is pre-installed, tested and delivered from our own production department or from approved collaborators. Our production staff consists of people with great expertise and enthusiasm to produce the best possible products for you. Having our own production site gives our customers excellent service in case something should go wrong, or if assistance is required. AKVA hold most of the parts for our products in stock, and our service staff is available on the telephone or on location in order to assist you if necessary. Safety, both for the user and for the equipment is our main focus when developing products.

This entire manual, and especially the safety chapter must be read and understood before commencing any work on the equipment

Before any work - including maintenance and repairs, is done with or on the Akvasmart Idema Net Cleaner, we recommend that all users are properly trained by AKVA group ASA. Users need to get to know this manual and its contents, and perform procedures and maintenance as described here to ensure reliable operations and a long lasting product. This manual answers most day to day questions and gives a thorough description of how to use and maintain the Akvasmart Idema Net Cleaner.

2.1 Contact information

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supportfishtalk@akvagroup.com

3 Information

Idema Net Cleaners were launched in 1987, and are today renowned for quality, high performance and their ease of use. The first Net Cleaners had single 30cm diameter cleaning discs, operated from the cage edge using a shaft. Underwater pressure washing of cages where fish reside, has become even more common as the requirement to environmentally friendly aqua-culture in larger cages provides the best scale of economics.

With this in mind, we have developed and improved the Akvasmart Idema Net Cleaners, and can now present the best range of net cleaners and high pressure pumps ever. This combi-nation offers the most efficient cleaning system suited for all types and sizes of cages.

In net cleaning, filtered high pressure sea water is used to remove marine fouling on the nets. Akvasmart Idema Net Cleaners use rotating cleaning discs mounted on support frames in various shapes and combinations. We use rugged, tailor-made high pressure pumps to run the cleaning discs.

The cleaning process starts with submerging the frame in the inside of the net, using high pressure sea water. Idema cleaning systems do not use any chemicals or scrubbing action, making them environmentally friendly and ensuring minimal wear on the net.

The large net cleaners can be operated automatically by two persons using a crane, winch, cap stand or as a integrated option on a ROV (Remotely Operated Vehicle). The smallest net cleaners can easily be operated from the cage edge by a single person.

Larger net cleaning frames can be delivered with cameras and recording systems that give full overview over the cleaning process, and makes it possible to inspect the net as it is being cleaned.

Gasoline, diesel or hydraulic driven net cleaners

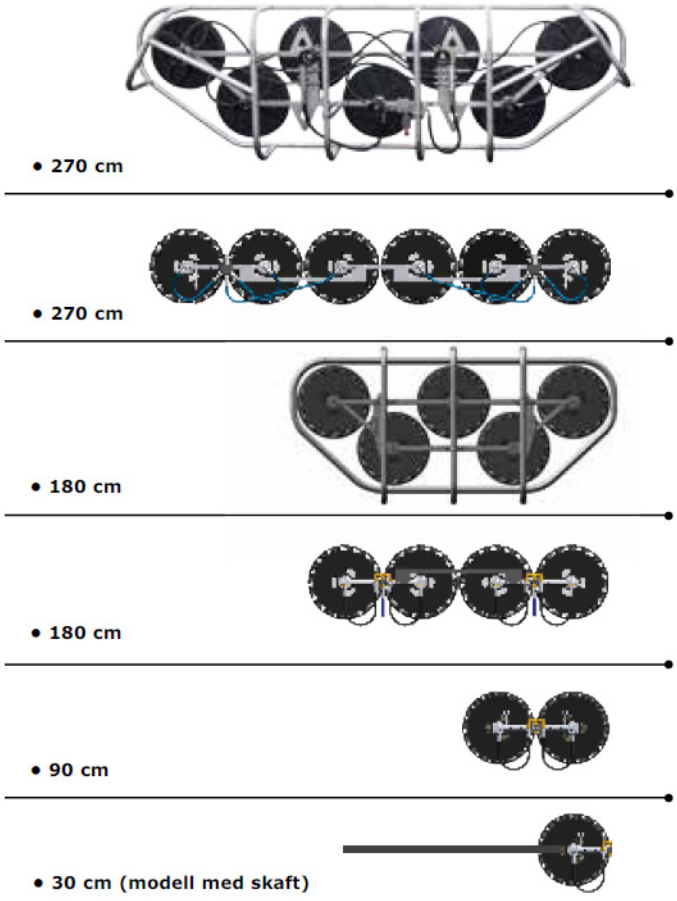
AKVA group offers a rugged series of high pressure washers for seawater, suited for various system solutions and cage sizes.

The gasoline net cleaners are light-weight and perfect as portable units.

The diesel net cleaners are almost maintenance free, use less fuel than the gasoline models and are well suited for large, powerful, permanent installations.

The hydraulic net cleaners are small, compact and almost maintenance free, perfect for below deck installations in workboats.

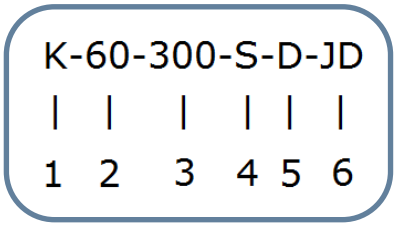
Net cleaning frames



The Idema Heavy Duty Cleaning discs are equipped with stainless steel frames. The discs have a rotation speed from 750-1500 rpm.

3.1 Model description

All high pressure net cleaners delivered by AKVA group have a uniform model description. The description contains information about capacity, structure and function. Example:



1) K = Cold water, V = Hot water

2) Liter water per minute

3) Water pressure (bar)

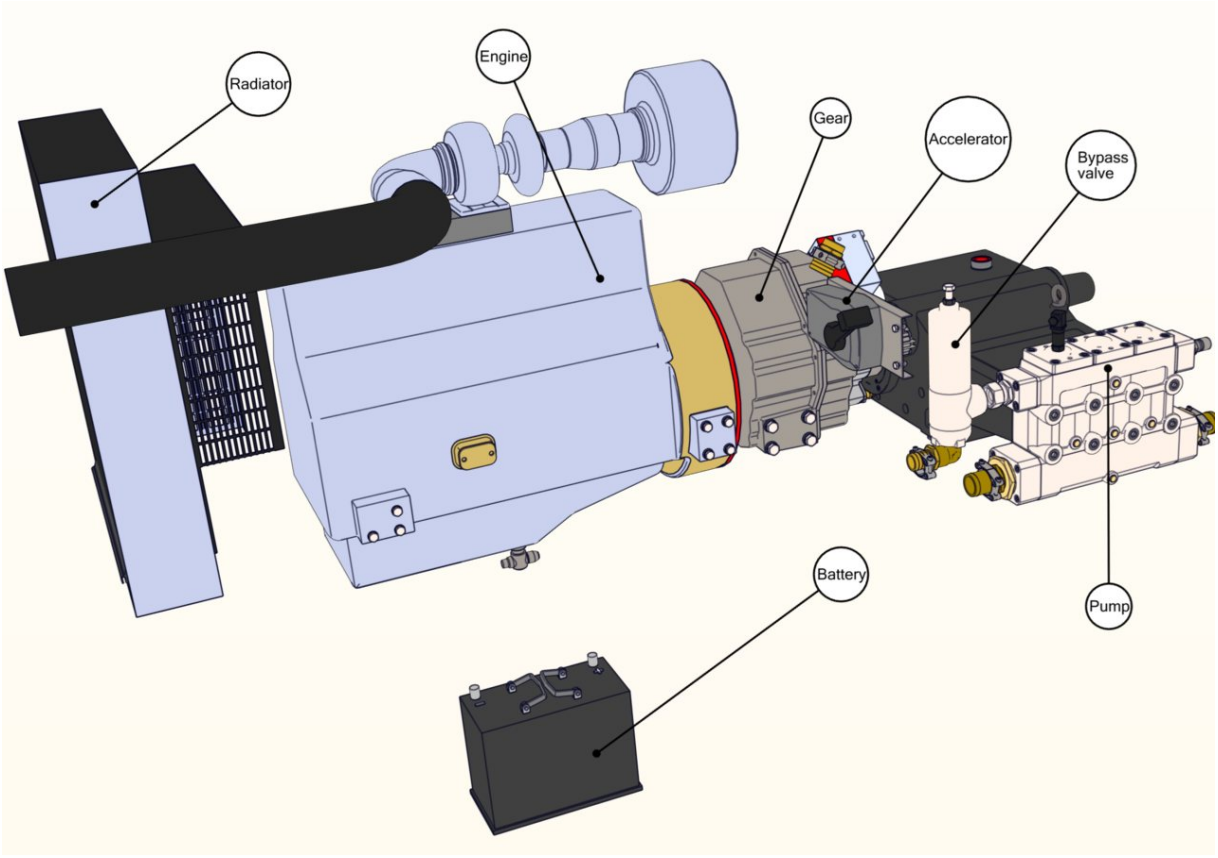
4) Water supply: S = Integrated suction pump
X = Without suction pump

5) Engine type: H = Hydraulic
B = Gasoline
E = Electro
D = Diesel

6) Engine fabrication: CO = Comer
VA = Vanguard
HO = Honda
HZ = Hatz
IV = Iveco
JD = John Deere
SU = Sunfarb

7) Volume/effect: B and D - effect in Hp
E - effect in kW
H - volume in ccm/rev

4 High pressure cleaner's main components



The cabinet front:

The cabinet backside:

4.1 Specifications

Net cleaner	Engine	Gear	Pump
K-136-300-SD	JD 6068 TF 258	ZF 301 C	MWN 32
K-188-300-SD	JD 6068 TF 258	ZF 301 C	LKN40 A 1750rpm
K-240-280-SD	JD 6068 HF 158 inter cooler 188hp	ZF 301 C	LKN 45 1750rpm

4.2 Specifications Washing rigs

Net cleaner	Washing rig
K-136-300-SD	Quad, Quint
K-188-300-SD	Quint, Hep
K-240-280-SD	Quint, Hep

5 Before use

5.1 General precautions

Show great caution when using any high pressure equipment. These systems generate severe forces and may cause damages to personnel and other equipment if used incorrectly. Regular control and maintenance is required to ensure safest possible use and as long lifetime as possible.

Reading every safety, user and maintenance instructions **before** using the equipment will reduce risks of personnel injuries and damages to the net cleaner and other equipment.

Bypass valves should open for water flow when the pressure inside the system exceeds the predetermined level. If this is not in order, the high pressure may cause serious consequences for both equipment and personnel.

High pressure water represents severe forces. Therefore, it is important that critical components are inspected and tested regularly

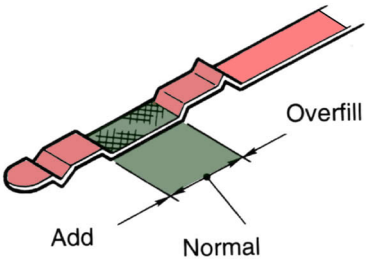
All users must read this entire manual before using it to make sure that all tasks are performed according to the instructions

The predetermined level of pressure in bypass valves must never be changed

Before every use, oil level in motor, gear and pump must be controlled according to the instructions in this chapter

5.2 Oil check

The motor and the gear box have dipsticks for checking oil. Motor dipstick is found on the back side of the cabinet, and the gear box dipstick is found in the front. Gear oil is filled into the same opening as the dipstick is put, and motor oil is filled into an opening in the front of the cabinet.



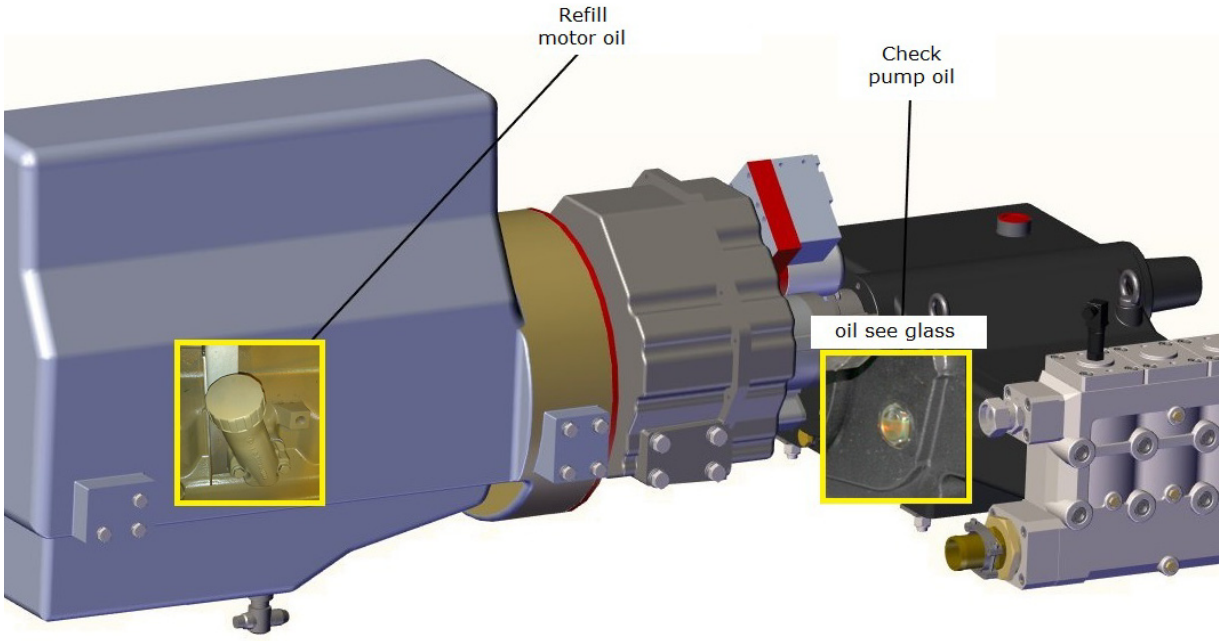
Read the oil level from the dipsticks.
Add oil if the oil level reaches the "Add" area, and drain oil if it reaches the "Overfill" area.

The pump has an oil level window (oil see glass) placed on the side facing the gear, and a refill hole on top.

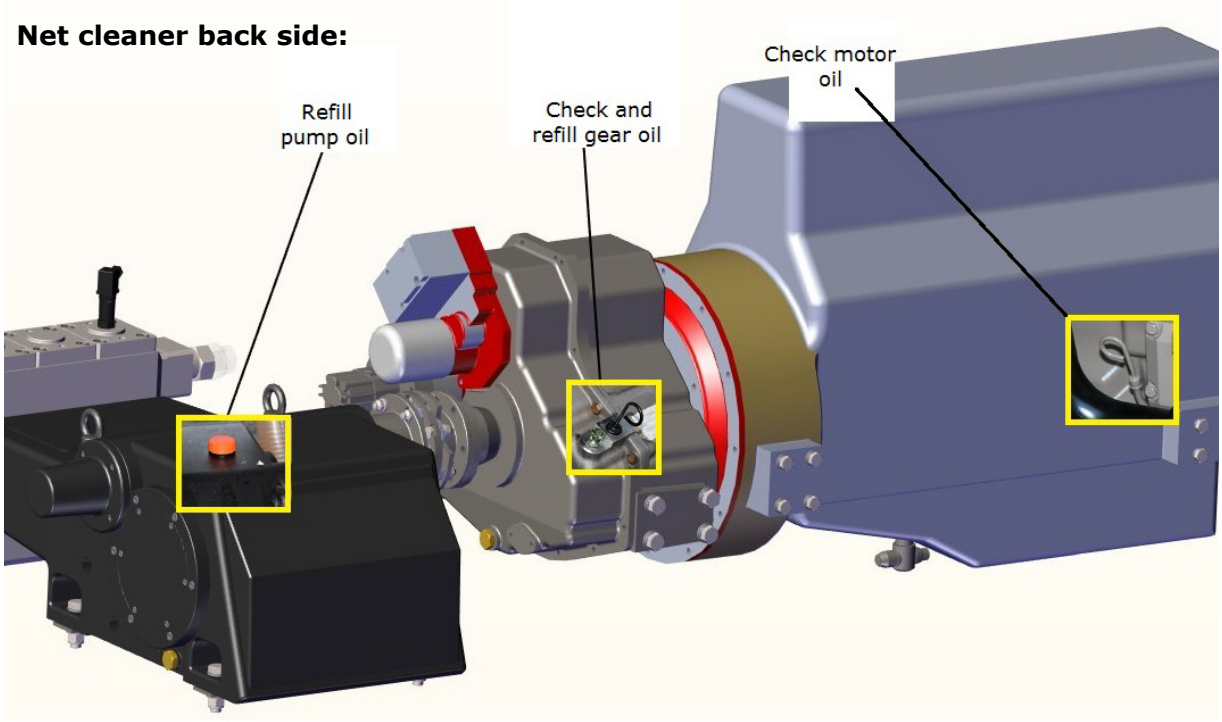
Gear: use same opening for check and refill in the front
Motor: check in the back, fill in the front of the cabinet
Pump: check in the front, fill in the top of the pump

! *See overview in the next page for overview of check and refill of oils for motor, gear and pump*

Net cleaner front side:



Net cleaner back side:



! *For further information on engines, gears and pumps, see the respective manuals.*

5.3 Coolant

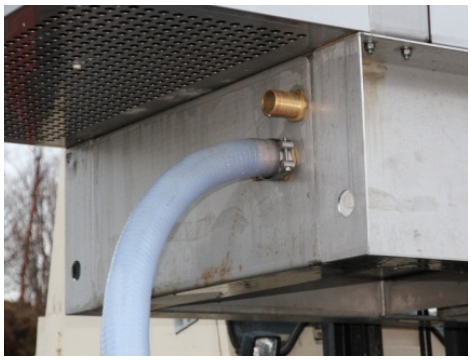
Check the coolant level on top of the radiator.
Open the lid to check the level. Refill in the same opening.

5.4 Hoses

All hoses used with this high pressure cleaner must be constructed in order to bear the working pressure of the equipment. Make sure the hose you are using can bear this pressure, by reading the labelling on the outside of the hose.

Hoses must be checked for tears and other damages. In case of damage, repair or replace the hose before use.

5.5 Suction hose

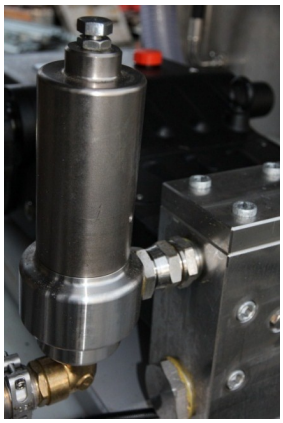


Make sure that the suction hose is well attached to the feed pump.

It is important that the entire suction filter is below water during the running of the net cleaner.

5.6 Safety/bypass valves

The predetermined level of pressure in the bypass valves must never be changed



Safety/bypass valves are installed in all high pressure equipment to ensure that the pressure inside the system never exceeds the component's maximum pressure tolerances.
The bypass valves are set to open for water flow when the water pressure inside the system exceeds the predetermined level.
If one valve is out of order, the high pressure that builds up inside the system may cause serious consequences for both equipment and personnel.

If water appears in the hoses connected to a bypass valve, something is wrong:

- Something may be wrong with the bypass valve itself. In that case, the valve must be overhauled or changed before use
- The pressure can be higher than the predetermined pressure. The most common cause of this is that one or more nozzles in the net cleaner are clogged. Check these and rinse them if they are clogged
- Check all hoses, including the ones on the net cleaning frames for bends, and flatten these
- Contact AKVA service personnel if the problem can not be solved according to these instructions. Contact information is found in chapter 2.1.

5.7 Net cleaning frames

Check the hoses on the net cleaning frame for bends, these should be flattened.

Check hoses for tears and other destructions. Repair or replaced damaged hoses before use.

Check all hose couplings and tighten if necessary.

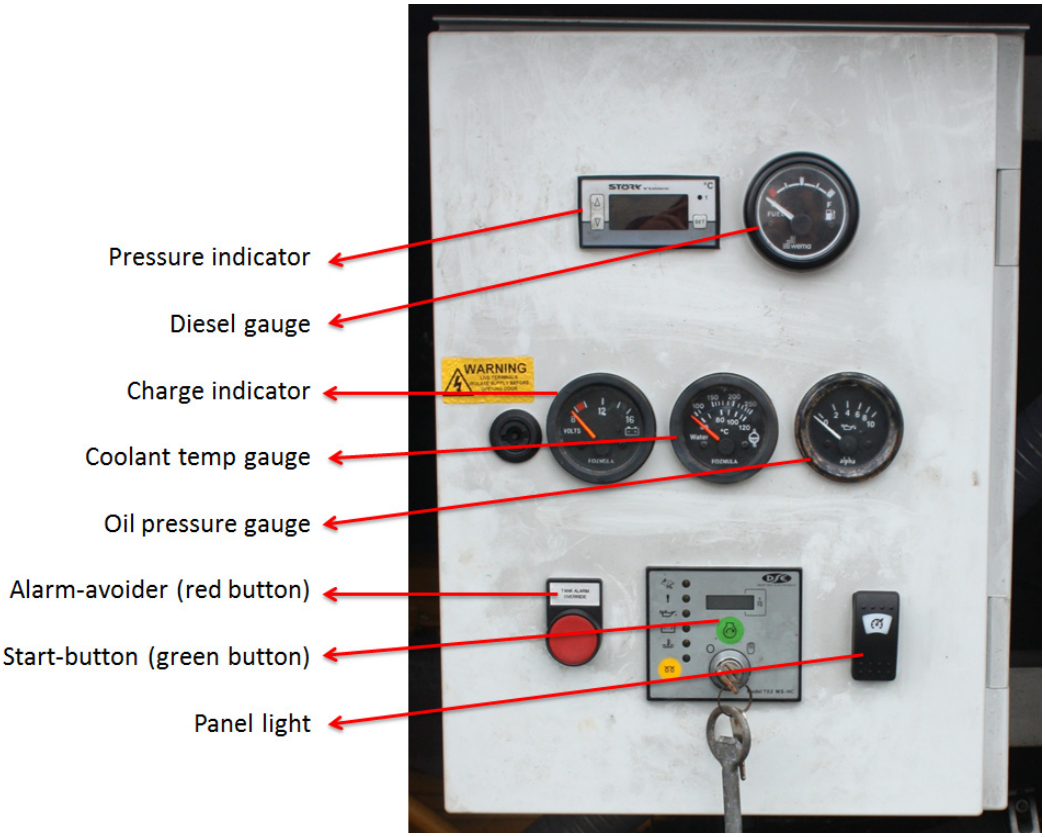
Run the system with feed pressure to check the conditions of all the nozzles.

6 Starting and stopping the machinery

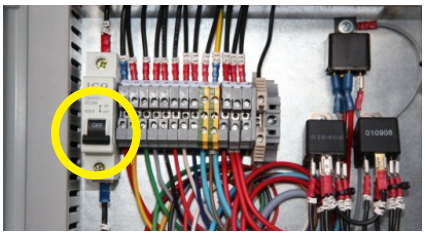
All users must read this entire manual before using it to make sure that all tasks are performed according to the instructions

After going through, and preparing all of the inspection instructions, you can safely start the system like this:

Control panel:



6.1 Instructions



1 Set the main switch (yellow ring) to "ON"

2 Press and hold the red button in the control panel

3 Turn the key

4 Press the green start button until the machinery starts (this normally takes about 2 seconds)

5 Release the red alarm avoider button

6 Open the cabinet door and engage the pump by moving the treadle forwards until you feel a slight resistance (see illustration in the next page). Leave the treadle here for about ten seconds, so that the pump can build up pressure before increasing the speed

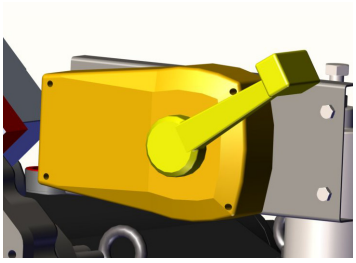
7 After 10 seconds, the power might be set to necessary working pressure

8 To stop, turn the treadle back to the start position, and leave the engine running idle to cool down the system. A immediate stop may cause destructions to the turbo and bearings. Leave the engine running for 3-5 minutes to prevent these potential destructions

9 Turn the key back to stop the system.

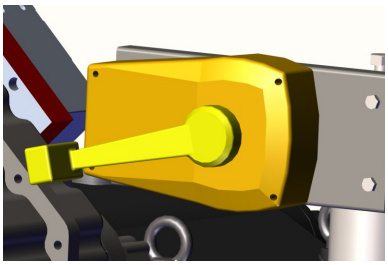
6.2 The treadle

a. Start up position



b. Leave the treadle in this position for about 10 seconds to build pressure

c. Push the treadle forward to increase motor power



7 Emergency stop and restart

In case of emergency, press the emergency stop button immediately.

Make sure that everything is ok before restarting the system.

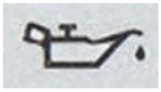
The emergency stop button has to be released before restarting. Turn the button according to the instruction arrow, and the button will be released out to starting position again.

Before resetting after an emergency stop situation, establish the reason for the stop and rectify the fault

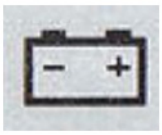
8 Control panel alarms

No function

Feed pressure too low (will activate emergency stop)



Oil pressure is too low (will activate emergency stop)



Charge light

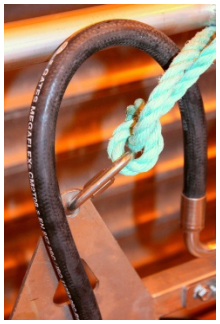
High engine temperature (will activate emergency stop)

No function

9 Net cleaning frames

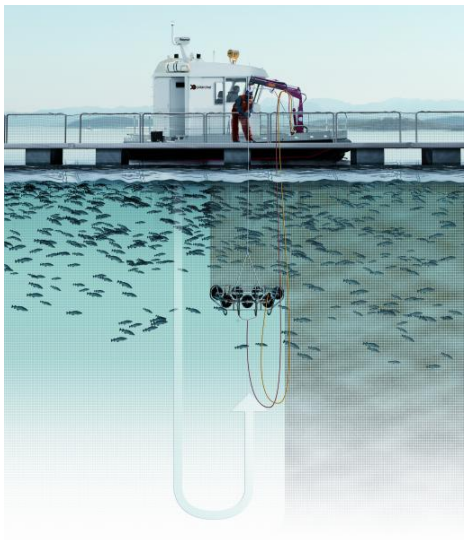
Safety equipments such as anti skid footwear and floating garments is mandatory when working on the cage edge

The rope for lowering and lifting the net cleaning frame is best connected with a safety hook to prevent wearing and tearing on the rope and prevents it from breaking.



The cleaning process is most efficient when the cleaning frame is being pulled upwards. When going down in the water, the frame will not sink controlled and will therefore not be cleaning very efficiently. So, whether using crane or manual labor when cleaning nets with high pressure cleaners, lower the frame as controlled as possible to the bottom of the net, avoid disturbing the fish. Then raise it slowly and controlled to achieve best possible result.

The cleaning frame must always be held under water when the machinery is running. For testing the nozzles, however it can be run above water, but only using feed pressure.



10 The mobile control unit

The mobile control unit is an extension part to large high pressure cabinet net cleaners that may be used with winch.

1 - Power switch
2 - Emergency stop button
3 - Roll ropes in or out

This is a simple unit that controls how deep the net cleaner is in the water. On top of the net cleaner cabinet is a reel for this rope. The unit is used to release and haul in the rope.

The unit can easily be attached to the operator’s belt to ease the procedure.

11 Cleaning and storage

Regular service and well performed maintenance are important factors for keeping functions running as they should, and for the product to operate according to expectations.

By following cleaning and maintenance instructions, the net cleaner will always be ready for use, and service costs will be minimized.

11.1 Cleaning after each use

- Keep the machinery clean, dry and in order
- Wash away any spills of oil immediately

- Do not use high pressure washers to clean this equipment, this can cause water intruding into the engine, pump, gear and electronics, and ruining these components
- Use a mild detergent, do not use strong degreasers
- The entire machine is coated with protection wax to reduce corrosion. After cleaning, always apply a new layer of wax on all surfaces. Apply the wax when the machinery is still warm, this makes it stick longer and better.

Avoid letting salt water dry off inside the system. Rinse through with fresh water after use to prevent corrosion and other damages caused by salt crystals on metal, rubber and other materials.

Rinse through with fresh water if the net cleaner is going to be stored for one week or more.

Also, rinsing the outside with fresh water regularly prevents corrosion in the surfaces. All moving parts, such as hinges, wheels, locks, gas regulators must be lubricated after each fresh water rinse.

Check all enamel covered surfaces for scratches, and fill these with lubricant or wax to avoid further corrosion.

If the equipment is disinfected before being moved to a different location, it has to be rinsed off with fresh water, and lubricant or wax added as mentioned above.

11.2 Cleaning instructions before storage

1 Always run fresh water through the entire system after use and when the net cleaner is going to be stored for more than one week

2 Mix 80% water and 20% antifreeze solution and run this through to conserve the system and to lubricate the sealings and to reduce the danger of frost damages in case of storing in temperatures below 0°C.
For storing in colder environments, increase the amount of antifreeze solution. See instructions on the solution bottle

3 If the system might be exposed to frost, it is important that the amount of water inside is as low as possible, so run the machinery without water intake until the water is drained out (no longer than 10 seconds!)

4 Empty pressure hoses and coil them up carefully.

11.3 Cleaning the washing rig

Do not disconnect the net cleaner from the system before is has been flushed through with fresh water.
All hoses and nozzles need rinsing too.
Remove filth and sprout from the discs, in front and especially between discs and the hubs.
Clean the ejectors intakes.

Warning! If the net cleaner is not maintained and cleaned properly, this is what it may end up like after some time:

12 Maintenance

12.1 Overview oil

- Oil for engine: 10W-40
- Amount of oil in engine: 20L

- Oil for pump: SAE 220
- Amount of oil in pump: 7L

- Oil for gear: SAE 30
- Amount of oil in gear: 9L (K-136-300-SD) or 14L (other)

Use dipsticks and oil see glasses to make sure that the oil amounts are correct for all components.

12.2 Engine maintenance

External cleaning: once a week
Oil check: every day
Oil change: First time after 100h use, thereafter every 500h
Change oil filter: First time after 100h use, thereafter every 500h
Air filter: change oil after 250h, check oil every day
Coolant check: every day
Coolant change: every other year

12.3 Change oil filter

Use filter forceps to remove the engine's oil filter.

1 Place the forceps around the filter cup
2 Turn to the left and release the filter
3 Take out the old filter, clean the cup with a clean cloth
4 Insert in a new filter
5 Re-attach the filter cup and fasten it using only hand power.

12.4 Change diesel filter

No tools are necessary for changing the diesel filter.

1 Open the filter cup
2 Check filter for impurities
3 Clean if possible or change filter if it is too filthy
4 Place the filter cup back on the machine.

12.5 Ventilating the diesel system

When air appears inside the diesel system, it needs to be ventilated out of the system.

Air can appear inside the system after:

- running out of diesel
- changing diesel filter
- any work is done with the system

The ventilation handle is placed on the right side of the diesel filter. Push the handle upwards several times, until you can feel a smooth resistance.

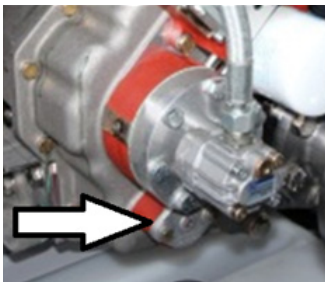
12.6 Gear maintenance

Cleaning: once a week
Oil level: once a day
Oil change, sieve cleaning: first time after 50h use, thereafter every 500h use or once a year
Oil cooler, cleaning and if necessary, change of zink anode:
- every six months

12.7 Oil cooler maintenance

1 Remove the end lid
2 Take out the internal parts and clean them
3 Stake the insides, clean and blow away any contaminations
Replace the internal parts
4 Replace the lid.

12.8 Coarse strainer maintenance



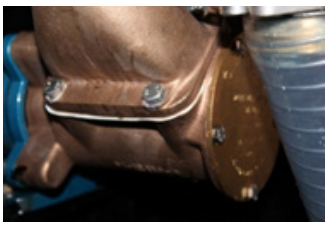
When gear oil is changed, the coarse strainer must be checked.

1 Release the plug
2 Remove the filter and clean or replace it
3 The two screws must be fastened with 18 Nm torque when reattaching the filter.

12.9 Pump maintenance

Cleaning: once a week
Oil check: every day
Oil change: first time after 50h use, thereafter every 500h
Inspection, function test: when required
Vents: when required
Pressure gaskets: when required
Pistons: when required

12.10 Feed pump maintenance



Impeller inspection: when required, but at least once a year
Impeller change: when required
Change ball bearings and gaskets: when required
Remove the cover and look inside to control the impeller visually
Repair or change impeller if necessary.

12.11 Changing zink anode

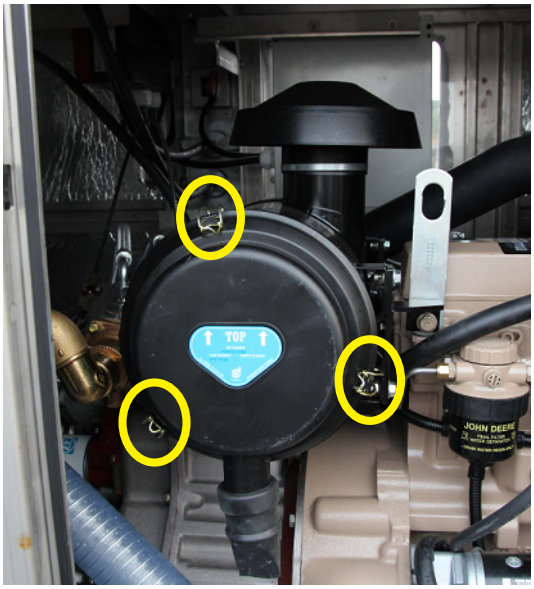
The zink anode is placed inside the nut marked with a yellow ring in the illustration to the left. This anode needs to be replaced every sixth months.

1 Release the nut
2 Remove the anode
3 Place a new anode in
4 Attach the nut.

12.12 Air filter maintenance

The air filter has an indicator placed on top of the engine, and when this turns red, it needs to be replaced.

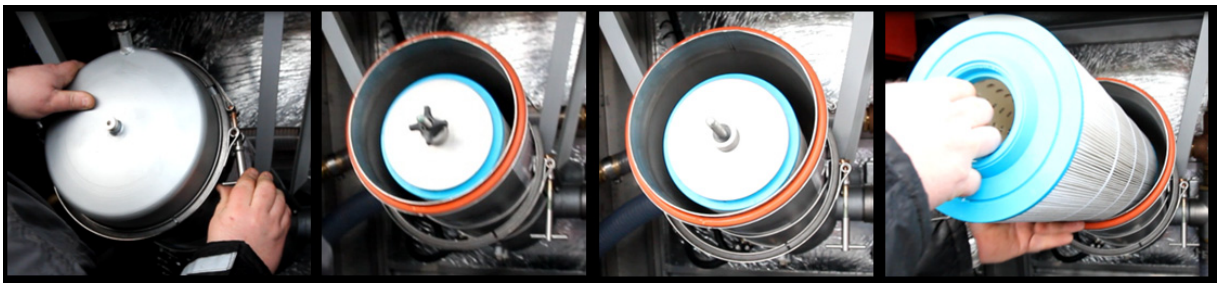
1 Release the cover by loosening the clamps (marked with yellow rings in the left image below)
2 Remove the filter
3 Check for filth and replace filter if it is too clogged for cleaning.



12.13 Sea water filter maintenance

Dual-pumped net cleaners have two sea water filters. These are placed above the pump in the cabinet. The filter must be checked every 100h.

1 Loosen the clamp around the cover and remove the cover
2 Unscrew the wing nuts
3 Remove the cover and take the filter out for inspection
4 Clean or replace the filters when required.



12.14 Check coolant

The coolant must be changed every other year.

1 Drain all of the coolant by opening the draining valve placed in the bottom of the radiator
2 Refill with fresh coolant and remember to check the level in the opening on top.

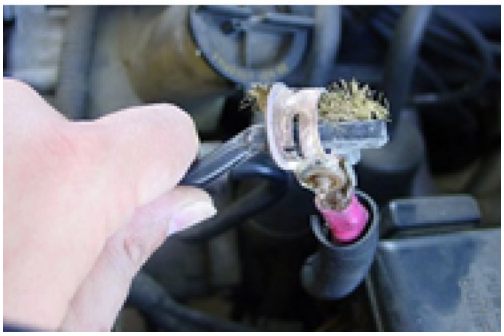
12.15 Battery maintenance

Battery level and poles checked every six months. When the poles become dirty, quick discharging of the battery may become a problem because the power may leak. Therefore, clean battery poles are important for optimal charge.

Before cleaning, the poles must be removed from the battery.

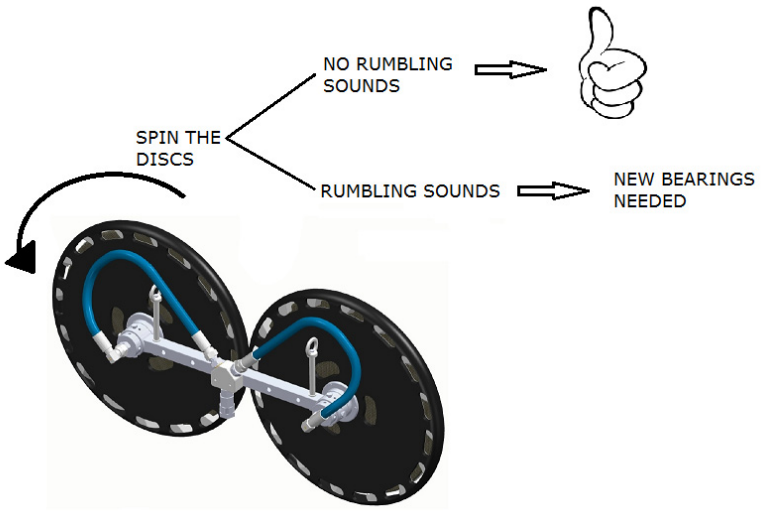
Use protection gloves and goggles to avoid being hurt by the very corrosive battery acid.

Use a steel brush to clean the poles.
Brush and clean the poles until they are shiny and clean.
Blow off any scrapings.



12.16 Net cleaning frame maintenance

Change ball-bearing when required. To test if bearings must be changed, spin the discs manually one by one and listen for rumbling sounds. When the bearings are ok, there should be no sounds, and if any rumbling sounds appear during this test, the bearings in the tested disc must be changed.



Run the system with feed pressure to check the condition of the nozzles on the net cleaner.

Make sure to check all nozzles, and clean them if necessary.

Hoses and hose couplings must be checked every six months.

13 Maintenance plans

Product	Activity	Service interval					
		Hours	Day	Week	Month	Year	Comments
Engine	Cleaning			1			
	Inspection motor oil level		1				
	Change of motor oil	500				1	First time after 100h
	Change oil filter	500				1	First time after 100h
	Change air filter					1	See filter indicator
	Change diesel filter	500					
	Inspection coolant level		1				
	Change radiator coolant					2	Every other year
Pump	Cleaning			1			
	Change of pump oil					1	First time after 50h
	Inspection oil level		1				
	Functions test					1	
	Cleaning salt water filter	100					
Gear	Cleaning			1			
	Change oil + clean sieve	500				1	First time after 50h
	Inspection oil level		1				
	Inspection oil cooler, cleaning, change sink anode					1	
Feeding pump	Inspection impeller					1	
Battery	Check battery level, clean battery poles				6		

NOTE: In case of double interaction in the table, act on what occurs first.

Fill in week number in the daily maintenance form on the next page, and fill inn month name in the weekly maintenance form. This is important to maintain regular and correct maintenance.

When a task is performed, sign the correct box.

Make copies of the forms before filling them in, and keep the copies in the maintenance folder.

! *Mark the last copy with a post-it or something similar to make sure that you never run out of copies!*

13.1 First time maintenance

Parameter	Check/ change after	Execution date	Executed by (signature)
1. Oil change, pump	25h		
2. Oil change, engine	100h		
3. Change oil filter	100h		
4. Change air filter	250h		
5. Change diesel filter	500h		
6. Check level/clean battery poles	6 months		
7. Inspection, impeller	1 year		
8. Function test, pump	1 year		

Comments to first time maintenance

13.2 Daily maintenance

Make copies of this form before filling in

Sign with your initials after the task is executed

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

13.3 Weekly maintenance

Make copies of this form before filling in

Sign with your initials after the task is executed

Month:	**Week__**	**Week__**	**Week__**	**Week__**
Clean the machine with fresh water				
Clean sea water filter				

Month:	**Week__**	**Week__**	**Week__**	**Week__**
Clean the machine with fresh water				
Clean sea water filter				

Month:	**Week__**	**Week__**	**Week__**	**Week__**
Clean the machine with fresh water				
Clean sea water filter				

Month:	**Week__**	**Week__**	**Week__**	**Week__**
Clean the machine with fresh water				
Clean sea water filter				

Month:	**Week__**	**Week__**	**Week__**	**Week__**
Clean the machine with fresh water				
Clean sea water filter				

Month:	**Week__**	**Week__**	**Week__**	**Week__**
Clean the machine with fresh water				
Clean sea water filter				

13.4 Registration of maintenance

Make copies of this form before filling in

Sign with your initials after the task is executed

Date	Parameter description	Operating hours	Next change	Signature

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Appendix B - Deviation form

Make copies of this form before filling in

Sign with your initials after the task is executed

Deviation control no.:	

Unit:	**Producer:**	**Prod.no.:**	**Purchase year:**

Deviation description:
Follow up proposition:
Date and signature, declarer:

Follow up directed:
Status:
New action for deviation no.:
Date and signature, follow up:

Appendix C - Notes